the cellular matrix. The further side of the cylinder is imperfectly shown, from having been out of focus in the photograph. The secondary fasciculi, proceeding to the leaf-stalks and rootlets, give the exterior a bristly appearance.

Fig. 12. A diagrammatic transverse section of the caudex. The interrupted circle represents the cut extremities of the fasciculi of the netted cylinder, and the scattered dots on its exterior those of the secondary fibro-vascular bundles of the petioles and rootlets.

[The above figures are mostly from photographs of the original specimens (now in the Museum of the Royal Botanic Garden, Edinburgh) by Mr. Andrew Adams of Aberdeen.]

XLI.—*On the Reproduction of the Bark-Lice* (Chermes, &c.); *a further Contribution to the Knowledge of Parthenogenesis.*

By Rudolph Leuckart.

[Concluded from p. 327.]

Before tracing these differences and analogies further, it is necessary, however, that we should glance at the *anatomical arrangement of the generative apparatus* in our Bark-lice (Pl. VII. fig. 1).

In the four or five species (three or, if *C. Abietis* is to be regarded as two species, four *Chermes*, one *Phylloxera*) there is a perfectly unmistakeable analogy in the formation of the female parts; and this is the more striking, as it at the same time furnishes a perceptible distinction from the female organs of the true Aphides*, which propagate both by oviparous and viviparous generations. On the whole, however, the type of the organs in question is the same as that we meet with in the latter.

With regard to the ovaries, it must first be indicated that the egg-tubes of our animals are in all cases composed of two, or even three (*Phylloxera*) chambers (fig. 1). From the previous statements with regard to the structure of the egg-tubes in the ordinary Aphides, we might suppose that this is the expression of a thorough-going distinction between these two groups; but I have ascertained by my investigations of this year, that among the Aphides there are species with plurilocular egg-tubes, although the greater number of them certainly have only one chamber, like the *Coccina*. Among these species with pluri-

* As far as we know, *Chermes* and *Phylloxera* are the only Aphides with solely oviparous generations. That there are also species with only viviparous generations, as stated by Kaltenbach, appears to me very doubtful. In *Schizoneura*, which is said amongst others to be in this case, I have proved the existence of an oviparous autumnal generation in the small memoir already repeatedly mentioned.

locular egg-tubes are *Aphis Quercus* and *A. platanoïdes**, the wingless females of which exhibit three (and *A. platanoïdes* even four) deposits, representing eggs, in the individual egg-tubes. (Dr. Claus of Marburg has also met with wingless females with plurilocular egg-tubes, in two apparently unnamed species of *Aphis* from *Betula alba*.)

If this latter observation were not sufficient of itself to efface the distinction which apparently prevails, with regard to the formation of the egg-tubes, between our Bark-lice and the other true Aphides, I must further indicate that the second, superior germ in *Chermes* (especially in *Chermes Laricis*, fig. 1) is not unfrequently formed only at a later time, or not until the preceding egg approaches its perfect maturity; that therefore, under such circumstances, the same egg-tube may consist sometimes of one and sometimes of more chambers, according to the age and state of development of its contents†. Moreover the eggs in the different tubes arrive at maturity at different times, so that tubes of one and two chambers may not unfrequently be met with together in the same ovary. In the same way, at certain times, the tubes of *Phylloxera* consist only of two chambers‡, those of *Aphis platanoïdes* of three, &c.

Although, therefore, the distinction between the unilocular and plurilocular egg-tubes does not appear to be very great, still, on the other hand, it is not to be altogether disregarded. This is most distinctly evidenced in the different destiny of the superior clavately-inflated extremity of the egg-tube, which, with its peculiar cellular corpuscles, has sometimes been regarded as a proper superior chamber. In the Plant-lice with unilocular egg-tubes this terminal piece, with its contents, is gradually lost during the evolution of the egg-germs; in the species with plurilocular egg-tubes it remains unchanged, just as it was with the first egg-germ, without ever diminishing perceptibly in size or becoming aborted.

* Dr. Claus called my attention to the fact that the nurses of this species are not unfrequently attached after death to the surface of the leaves inhabited by them, by means of a rather large convex disc. On closer examination I recognized in this disc the cocoon of a larva which, from its appearance, would probably be that of an Ichneumonidous insect. This larva lives, up to the time of its change to the pupa state (and indeed always singly), as a parasite in the Aphides, but afterwards breaks through at the ventral surface, and then spins its cocoon between its previous host and the surface of the leaf.

† This is also in accordance with the fact that the egg-tubes of our species of *Chermes* (*C. Abietis*) are at first developed as simple tubes, exactly in the same way that I have described for the egg-tubes of *Aphis* and *Coccus*.

‡ Individual egg-tubes of *C. Abietis* also now and then exhibit a third egg-rudiment.

In the small treatise on Parthenogenesis already repeatedly cited, I have referred to this superior portion of the unilocular egg-tubes in the Aphides as the "vitelligene;" and indeed its resemblance to the vitelligenes of the plurilocular egg-tubes described by Stein is unmistakeable. Supposing this interpretation to be correct, all analogy would lead us to expect that a vitelligene of this nature would be repeated between each two egg-germs in the plurilocular egg-tubes of our plant-lice. But this is not the case. The Aphides with plurilocular egg-tubes also possess only a single vitelligene, and this only at the upper end of the egg-tubes (fig. 1).

This circumstance must render it doubtful, notwithstanding any similarity, whether it be correct to regard the terminal piece in question as a "vitelligene." We might now suppose, with apparently greater justice than previously, that the structure in question is a so-called germigene, and regard the individual cellular corpuscles in its interior as egg-germs; and this perhaps might be done the more readily, as the compartment in question resembles, in the formation and appearance of its contents, the terminal piece of the so-called germ-stock in the viviparous Aphides, the individual cellular corpuscles of which, according to Leydig, become converted directly into the future germs. In this way, therefore, we may establish an analogy between the genitalia of the viviparous and oviparous Aphides, which may also perhaps, in another respect, serve as a guide for the comprehension of the entire mutual relation of these two forms of individuals.

I admit that I do not regard this question as yet ripe for decision. It is certain that, from our present observations, the consideration of this terminal piece as a germigene is somewhat seductive; but the aspect and nature of the cellular corpuscles in its interior are different from those ordinarily met with elsewhere in the germigenes of insects; and, moreover, I have never yet succeeded (nor, indeed, with the viviparous Aphides) in convincing myself by direct observation of the conversion of these cells into egg-germs. On the contrary, we may detect certain differences in size, behaviour towards reagents, &c., between the germinal vesicles of the youngest ova and the nuclei of these cellular corpuscles (which, nevertheless, must be identical if the latter are to be regarded as egg-germs), such as are scarcely in favour of any such assumption. Thus, for example, in *Lecanium Hesperidum* I found the germinal vesicles of the youngest ova 0·02 millim. in diameter, whilst the nuclei of the cellular corpuscles in the terminal compartment measured 0·037 millim. In *Coccus Hesperidum* the germinal vesicle, at a still earlier grade of development, was 0·009 millim., also smaller than the nuclei,

which measured 0·013 millim. The same thing applies to the Aphides. To this we must add the fate of these cellular corpuscles in the unilocular egg-tubes of the Aphides and *Coccina*, which is also scarcely in favour of the opinion that they are converted into egg-germs, although indeed cases of abortive egg-germs are not very rare.

On the other hand, the interpretation of the compartment in question as a "vitelligene" appears by no means to be contradicted by its simplicity in the plurilocular egg-tubes of our Aphides. We certainly must not assume, as Stein does, that in the case in question the granular yelk is *exclusively* furnished by the cells of the vitelligene. This one-sided interpretation may probably find but few supporters at the present day. I think we have arrived pretty generally at the opinion that, besides the cellular corpuscles of the vitelligene, the ordinary epithelial cells of the egg-tubes also take part in the deposition of the yelk. This part is indeed probably only a subordinate one; but in our Aphides it may suffice for the completion of the maturity of the egg, the rather as the contact with the terminal compartment is not interrupted until a somewhat late period—indeed not until the yelk has already grown to a very considerable mass.

With regard to the histological structure of the egg-tubes, there is nothing particular to mention, unless it be the circumstance that our Bark-lice closely resemble the other Aphides in the great number of the cellular corpuscles occurring in the terminal compartment. Between these and the structureless proper membrane we not unfrequently see a delicate epithelial layer, which, however, also occurs in the same place in the allied animals, and does not appear to be by any means deficient even in the viviparous Aphides. The process of egg-formation is exactly the same as described by me in *Aphis* and *Coccus*. Even the short and solid peduncles adhering to the inferior pole of the egg-shells in *Chermes* constitute no characteristic distinction of our animals, since I have found the same structure on the eggs of *Aphis Quercus* and *A. platanoïdes**.

With regard to the number of egg-tubes in the ovaries of our Bark-lice, we find very considerable discrepancies, not only in different species, but also in the different winged and wingless individuals of the same species. In the latter respect it prevails as a law—if we may judge from *C. Abietis* and *C. Laricis*—that the winged individuals, as they are on the whole of a more slender structure, also possess a smaller number of egg-tubes†.

* It may be mentioned here, in passing, that the small winged males of *A. platanoïdes* possess three perfectly separated, pyriform testicular tubes on each side.

† This also appears to apply to the winged and wingless viviparous

The greatest number of egg-tubes occurs in the wingless females of *Chermes Abietis*, which is also by far the most prolific of all Bark-lice. In this species I have counted 20–24 egg-tubes on each side—a number which almost reminds one of the structure of the ovary in the *Coccina**, to which our plump animals (like the rest of the wingless Bark-lice) also bear an external resemblance. In the winged individuals the number of egg-tubes varies between far greater extremes: I have met with individuals with 24 and 30 egg-tubes in all, and with others which had only 10. The latter specimens were at the same time much smaller than the others; they are Ratzeburg's so-called males. In the number of egg-tubes, *Chermes Abietis* is approached most closely by the genus *Phylloxera*, the wingless females of which usually exhibit five egg-tubes on each side. *Chermes Piceæ*, in the wingless state, possesses three or four egg-tubes on each side (sometimes also nine in all). The number is lowest in *C. Laricis*, the wingless individuals of which very constantly possess six egg-tubes, whilst the winged examples (fig. 1) usually present only four (but sometimes five) in all.

The oviducts to which the egg-tubes are attached are, as in the Aphides, of but inconsiderable length, and have a distinct muscular layer, with fibres which principally run in a transverse direction and are repeatedly branched. A very similar but still more strongly developed muscularity is also possessed by the single oviduct.

In the oviparous Aphides and the *Coccina* there are, as is well known, two different kinds of accessory structures on this oviduct,—a pair of sac-like or tubular organs with fatty contents, which we shall indicate as a lubricating gland (*Schmierdrüse*), and at a greater or less distance above these, a roundish or pyriform pouch, the *receptaculum seminis*. The case is very different in our Bark-lice (fig. 1). On a superficial examination we find only two accessory organs, which are attached at about the limit of the posterior third of the oviduct, and show themselves to be the lubricating gland, notwithstanding several peculiarities, both by their structure and the nature of their contents. Above this gland we may seek in vain for another appendage; but, on the other hand, far below, immediately over the obtuse

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individuals amongst the Aphides; at least, I have hitherto met with the unilocular germ-tubes first described by me only in winged individuals of these animals. Nevertheless, it can by no means be said that all winged Aphis-nurses possess unilocular germ-tubes. I also know species the winged nurses of which are provided with plurilocular and multilocular germ-tubes.

* In the true Aphides I have never met with more than four egg-tubes on each side.

and conical ovipositor (undoubtedly the same structure that Ratzeburg indicated as the penis, but which occurs in exactly the same way in all individuals), we see a very inconsiderable pedunculated pouch appended to the sexual passage. The stalk of this organ is lined with a tolerably strong chitinous plate; but this covering gradually disappears towards the upper part, and at last vanishes so completely that it requires great attention, and particularly favourable preparation, to enable us to make sure of the existence of a cavity in the interior. The wall of the pouch consists of delicate, clear, vesicular cells.

It would, of course, be most interesting to ascertain the physiological signification of this organ, as by this means the question would be decided whether these Bark-lice are or are not furnished with a *receptaculum seminis*. For this purpose, unfortunately, I possess no data. I have never observed any peculiar contents in the vesicle in question, nor have I ever discovered it in other Aphides. If, under such circumstances, we may suppose it possible that this represents a seminal receptacle, on the other hand, its position and appearance are so little in favour of this supposition that I am far more inclined to assert that there is an entire absence of a seminal receptacle in our Bark-lice. We are acquainted with many insects in which the secretory appendages on the oviducts are increased (even in the *Cicadæ*, which are allied to the Aphides, we meet with many such structures); it is therefore possible that the Bark-lice may be amongst this number.

The lubricating glands which, in the Aphides, usually appear as roundish pouches, and rarely (e. g. *A. platanoïdes*) as long and wide tubes, likewise differ in their organization in the Bark-lice. *Phylloxera* possesses on each side (fig. 4) a cylindrical appendage repeatedly notched, the short and stump-like branches of which all lie in the same plane. The cellular walls are of considerable thickness, and enclose a thin chitinous tube, which, at its lower end, close to its insertion into the oviduct, becomes dilated into a flask-shaped cavity. The contents of these tubes consist of the same yellowish oil which is elsewhere met with in the lubricating glands. It may be expelled by pressure from the tube into the flask-shaped cavity, which is also usually filled with it, and thence into the oviduct. At the point where the two accessory glands open into the oviduct, the latter is of considerable width. At the same place there is, in the interior of the oviduct, a peculiar loop-like structure, which, on closer examination, proves to be a narrow, much-curled, chitinous band, clothing the oviduct in an annular form exactly at the level of the accessory glands, and amalgamating on each side with the chitinous wall of the flask-shaped oil-vesicle. This band does not, however, lie

loose in the oviduct; it is rather only an annular thickening in the delicate chitinous coat which lines the entire oviduct.

In *Chermes* (figs. 1–3) there is the same chitinous band as in *Phylloxera*, and also an evident, though less distinctly separated, funnel-shaped or pouch-like oil-vesicle; but the gland is very strikingly different. It appears on each side as a flattened ear-like appendage of an oval form, with a space of a similar shape in its interior, and a delicate, strongly granulated, chitinous lining. The exterior surface of this chitinous wall is drawn into numerous folds, which are continued between the neighbouring cells of the gland, and are gradually lost. At the point of insertion of the glands, the oviduct (fig. 2) forms an inflation of considerable size but with little muscularity, which is constricted in the middle by the elastic contraction of the chitinous band. As soon as an egg passes this spot, this constriction is effaced, whilst the chitinous band at the same time gradually expands (fig. 3) and acquires a rather smooth appearance. I will not here dwell further upon the mechanical importance of this arrangement, hitherto discovered only in the Bark-lice; it is, however, evident that in it the elasticity of the chitinous band is of the highest importance.

To the preceding account of the structure of the generative organs in the Bark-lice, and their remarkable mode of reproduction, I shall take the liberty of adding a few further observations.

The first relates to *the occurrence of the two different forms* indicated by us amongst the parthenogenetic females of these animals.

We have characterized these two forms as wingless and winged. It must not, however, on this account be supposed that their distinctions are limited to the presence or absence of organs of flight, and that the differences here occurring may be compared to those which we meet with as regards the formation of the wings in many species of Orthoptera (see Fischer, Entomol. Zeitung, 1852, p. 15) and Hemiptera. The distinctions of these two forms are far more considerable; they extend to the entire external organization of the individuals in question, to their size, form, and the structure of the segments of the body, and affect even the internal structure in a remarkable manner. Without a knowledge of their genetic relations, the two forms would necessarily be regarded not merely as representatives of different species, but even of different genera. The difference is scarcely less than that in the sexes of the *Coccina*. In other words, it is a complete dimorphism that we here meet with.

That these distinctions are also expressed in the mode of life is no more than might have been expected; and indeed, on the

most superficial examination, the part which the two kinds of individuals have to play in the history of our Bark-lice is seen to be distinct. The wingless females serve especially for the maintenance, the winged ones, on the contrary, principally for the diffusion of the species. The former are highly fertile for a long time, but at the same time (probably in intimate connexion with this property—see Leuckart, art "Zeugung," in Wagner's 'Handwörterbuch,' iv. p. 719) scarcely in a condition to quit their dwelling-place. The existence of the species would perhaps be endangered in many ways, if the timely appearance of winged females did not furnish the means of finding new dwelling-places and sources of nourishment. But with the transfer of the ova the task of these winged females is fulfilled. After depositing the eggs, a few days after their birth, they perish.

A very similar dimorphism also occurs, as is well known, in the so-called *nurses* of the ordinary Plant-lice, which in the first generations are likewise wingless, but in the later ones are almost always furnished with wings.

These are circumstances to which very little attention has hitherto been paid. We usually speak merely of the difference of two sexes, and tacitly suppose a complete agreement between all the individuals of these sexes. With such a notion, it certainly appears highly anomalous when, in the communities of the social insects, we suddenly meet, besides the unmistakeable males and females, with other forms of individuals, and recognize these as a peculiar, remarkable modification of these sexual animals. The Plant-lice show us that a similar polymorphism also occurs elsewhere among Insects, and that especially the female individuals of these animals very frequently differ from each other even by peculiarities of their structure, according to the difference of their appointed tasks.

A second observation refers to *the relation of the Parthenogenesis occurring in these Bark-lice* (*and in certain* Coccina) *to the so-called alternation of generations in the Aphides.*

That these two modes of reproduction are in many respects allied and similar has already been pointed out by me in another place ('Generationswechsel und Parthenogenese,' p. 44). Not long ago, indeed, it was thought right to speak of an infinite difference between the Aphis-nurses and females; but such a notion now appears erroneous. Our object is rather to test the extent and value of these analogies—to ascertain especially whether the constantly-reviving assertion recently supported by Claus (Generationswechsel und Parthenogenese im Thierreiche, 1858, p. 22), that the so-called nurses of the Aphides are essentially nothing but parthenogenetic females, is correct.

The decision of this question is intimately connected with our opinion as to the nature of the reproduction occurring in the so-called nurses; it depends upon whether we regard this as an asexual reproduction or not.

The preliminary question that naturally first presents itself here is, where are we to seek in general for the distinguishing characteristics of sexual and asexual reproduction. If we indicate that reproduction alone as sexual in which a cooperation of two kinds of reproductive matter (in other words, a fecundation) takes place, there remains, of course, no ground for bringing the alternation of generations in the Aphides into the question at all. But then, to be consistent, we must refer Parthenogenesis to asexual propagation, as indeed is done by Radlkofer ('Ueber das Verhältniss der Parthenogenesis zu den anderen Fortpflanzungsarten,' 1858). Whether this view will some day find general acceptance, I do not know; but to me it appears to be rather bold to regard the same substratum, an egg, sometimes as a sexual, and sometimes, just according to circumstances, as an asexual reproductive material*. In my opinion, it is always the same—always the product of the same (sexual) activity, whether the cycle of conditions under which it is developed into a new creature be closed by the access of semen, or without this. Wherever we have to do with an egg, there also, in my opinion, sexual reproduction always takes place.

It appears to me, therefore, that it is less the occurrence of a fecundation than the nature of the developing substratum that must guide us in the assumption of a sexual or asexual propagation.

In the case now especially before us, there would also be the question whether the germ-corpuscles of the viviparous Aphides can be regarded as eggs.

That these germ-corpuscles are cells like the eggs, and indeed cells which become converted into the embryo in a manner analogous to that of the eggs, can no more be doubted, after the recent investigations, than the morphological relations of the germ-tubes and ovaries in which the reproductive matters in question originate. It is even possible that future investigations may demonstrate an essential accordance in the mode of production of these two kinds of structures. All this must incline us, to a certain extent, to regard the germ-cells and ova of the Aphides as morphologically identical structures.

* The criterion of sexual and asexual reproduction put forward by Radlkofer, namely the idiotypic or zelotypic nature of the product, cannot suffice here (as indeed in other cases in the alternation of generations with larval nurses); for the product of parthenogenesis furnishes, *e.g.* in *Chermes Abietis*, not (zelotypic) copies of the parents, but individuals of a different and independent original development (idiotypes).

On the other hand, however, it cannot be denied that many considerations come in the way of the assumption that the two kinds of reproductive bodies occurring in the Aphides are both of the nature of ova.

I will not dwell too much upon the fact that, according to this supposition, the Aphides would produce two kinds of eggs. We are acquainted with similar facts in other animals, especially the *Daphniæ* and Rotifera*, the reproduction of which might also be adduced in favour of this view, inasmuch as, according to the investigations of Lubbock (Phil. Trans. 1857, i. p. 98) and Cohn (Zeitschrift für Wiss. Zool. 1858, p. 284), the animals in question also possess the faculty of Parthenogenesis. It is true that the two kinds of eggs of the above-mentioned animals are by no means so strikingly different as the eggs and germ-cells of the Aphides; but we must also admit that the peculiarities of the latter (judging from my observations upon the ova of the Cestoid worms and their development) by no means overstep the bounds of the empirically established limits of egg-formation, remarkably as these peculiarities, on the other hand, approach to the nature and destiny of unmistakeable germ-cells. (Generationswechsel und Parthenogenese bei den Insekten, p. 20.)

It appears to me to be of far more importance, that the germ-granules of the Aphides are evidently not calculated for any fecundation. I have taken a previous opportunity of pointing out this distinction (Generationswechsel und Parthenogenese, p. 110). At that time it appeared to me sufficiently great, notwithstanding any similarity to Parthenogenesis, to cause me to regard the reproduction of the Aphides as an alternation of generations. An egg which excludes all fecundation still appears to me to be a somewhat problematical structure; but this furnishes no sufficient reason for denying the possibility of such eggs. Claus here refers to the eggs of the worker bees, which would also never be fecundated, and we might cite other cases, and especially our Bark-lice, in which even the organization of the sexual passages, in the same way as in the viviparous Aphides, appears to betray the absence of a sexual intercourse. But all these cases only present limited analogies, inasmuch as the obstacles to fecundation in them (as, indeed, Claus admits) consist only in external, more or less accidental conditions, and are by no means caused, as in the Aphides, by the nature of the germinal product.

* The Freshwater Bryozoa can scarcely be adduced here, as, according to Allman (Monogr. of the Freshwater Polyzoa, p. 37), the so-called winter-eggs of these animals are not eggs at all, but structures of very different organization and development, which the author regards as asexual reproductive bodies (statoblasts).

A second circumstance, of great importance in the inquiry into the nature of the reproduction of the Aphides, is that the germ-granules of these animals are only developed in certain individuals, whilst other individuals, making their appearance under particular circumstances, lay unmistakeable eggs, and fertilize these in the usual manner.

From the point of view of the alternation of generations, such a regular alternation of fertilized and unfecundated individuals appears quite natural, and even necessary; but in the domains of Parthenogenesis, as far as our present knowledge goes, we seek in vain for an analogous case. Although in the Bark-lice, in *Lecanium Hesperidum*, *Solenobia lichenella*, and other animals which usually propagate exclusively by Parthenogenesis, a fecundation (by the males, which are still entirely unknown to us) may perhaps take place from time to time, there is still not the least ground for assuming a regular, and, under certain circumstances, necessary repetition of this process. In all these cases we must take the possibility of a fecundation into consideration for every distinct individual; a fecundation which takes place only occasionally, and then necessarily, in particular individuals, but is and must be just as regularly dispensed with in the intervals, has been recognized at present only amongst animals which are developed in accordance with the alternation of generations.

If, in spite of all these considerations, the reproduction of the Aphides is to be ranged under Parthenogenesis*, we are compelled, as, indeed, Claus very justly felt, to establish a peculiar form for it. This would then stand in precisely the same relation to the ordinary Parthenogenesis, in which each individual produces eggs capable of spontaneous development, as the alternation of generations to ordinary asexual reproduction, which, as is well known, in the animals with an alternation of generations, is likewise transferred only to particular individuals, peculiarly organized for the purpose.

The Parthenogenesis of the Aphides would thus still remain to a certain extent allied to the alternation of generations, even if it did not positively coincide therewith.

We must leave it to future observers to decide positively as to the justice of one or other of these views. Our observations upon Parthenogenesis are still so recent, and the possibilities of the differences and combinations occurring here so little known and weighed, that it appears scarcely possible at present to formulize

* It may be mentioned here, in passing, that, from analogy with the Aphides, the propagation of *Gyrodactylus elegans* must also be regarded as Parthenogenesis. Here also there is the same analogy between the nurses and sexual animals, the brood-stock and germ-stock, the germ-cell and the egg (germinal vesicle).

in either direction. We also still want many important data, necessary, and perhaps decisive, in the estimation of the conditions now under consideration. Under such circumstances we cannot emphatically enough recommend the continued careful study of the Aphides. We must still admit the truth of the concluding sentence appended by the acute De Geer to his memoirs upon the Aphides :—"The Aphides are insects which are in a position to overthrow the entire supposed system of generation, and to confuse those who attempt to investigate this mystery of nature."

Giessen, Sept. 1858.

Postscript.

In the course of the present summer I have been no more successful than last year in discovering male Bark-lice, or even detecting any trace of their existence. The only thing that I can add to the preceding statements, is that the comparative time of the evolution varies considerably according to external circumstances. Whilst, last year, the second winged generation made its appearance only in August, I observed it this year as early as the end of June.

Giessen, July 12, 1859.

EXPLANATION OF PLATE VII.

Fig. 1. Sexual apparatus of the winged female of *Chermes Laricis*.
Figs. 2 & 3. Lower part of the single sexual passage of *Chermes Abietis*, with the two lubricating glands.
Fig. 4. The same part in *Phylloxera Quercus*.

XLII.—*Observations on the genus* Sacculina, *Thompson* (Pachybdella, *Diesing*; Peltogaster, *Rathke*). By R. Leuckart*.

[With a Plate.]

In his "Travelling Observations in Scandinavia†," and "Contributions to the Fauna of Norway‡," Rathke has described, under the new generic name of *Peltogaster*, two species of a very peculiar flat and sac-like parasite, which is attached, by means of a "sucker-like structure," to the abdomen of the *Paguri* and of certain Brachyurous Crustacea. Rathke regarded this remarkable animal as a worm, but at the same time indicated (at least in the anatomical description contained in the memoir first quoted above) certain analogies with *Cyclops* and the *Lernæa*.

* Translated from Wiegmann's 'Archiv,' 1859, p. 232, by W. S. Dallas, F.L.S., Keeper of the York Museum.

† Neueste Schriften der naturf. Gesellsch. in Danzig, 1842, Bd. iii. Heft 4, p. 105.

‡ Verh. der K. L. C. Akad. Bd. xx. Abth. i. p. 245.